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Johns Hopkins University

BALTIMORE .

*General Statements in respect to the Courses
of Instruction which are offered to
Graduates of Colleges and other
Advanced Students*



PUBLICATION AGENCY OF THE JOHNS HOPKINS UNIVERSITY

1888

Press of Isaac Friedenwald
Baltimore

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All communications should be addressed to the REGISTRAR
OF THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND.

May, 1888.

FACULTY, 1887-88.

- DANIEL C. GILMAN, LL.D., President of the University.
BASIL L. GILDERSLEEVE, PH.D., LL.D., Professor of Greek.
G. STANLEY HALL, PH.D., LL.D., Professor of Psychology and Pedagogics.
PAUL HAUPT, PH.D., Professor of the Shemitic Languages.
H. NEWELL MARTIN, DR.SC., A.M., M.D., Professor of Biology, and Director of the Biological Laboratory.
SIMON NEWCOMB, PH.D., LL.D., Professor of Mathematics and Astronomy.
IRA REMSEN, M.D., PH.D., Professor of Chemistry, and Director of the Chemical Laboratory.
HENRY A. ROWLAND, PH.D., Professor of Physics, and Director of the Physical Laboratory.
WILLIAM H. WELCH, M.D., Professor of Pathology, and Director of the Pathological Laboratory.
JOHN S. BILLINGS, M.D., LL.D., Lecturer on Municipal Hygiene.
HERBERT B. ADAMS, PH.D., Associate Professor of History.
MAURICE BLOOMFIELD, PH.D., Associate Professor of Sanskrit and Comparative Philology.
WILLIAM K. BROOKS, PH.D., Associate Professor of Morphology, and Director of the Chesapeake Zoölogical Laboratory.
WILLIAM T. COUNCILMAN, M.D., Associate Professor of Anatomy.
THOMAS CRAIG, PH.D., Associate Professor of Applied Mathematics.
A. MARSHALL ELLIOTT, PH.D., Associate Professor of the Romance Languages.
RICHARD T. ELY, PH.D., Associate Professor of Political Economy.
GEORGE H. EMMOTT, A.M., Associate Professor of Logic and Ethics, and Lecturer on Roman Law.
HARMON N. MORSE, PH.D., Associate Professor of Chemistry, and Sub-Director of the Chemical Laboratory.
WILLIAM E. STORY, PH.D., Associate Professor of Mathematics.
MINTON WARREN, PH.D., Associate Professor of Latin.
GEORGE H. WILLIAMS, PH.D., Associate Professor of Mineralogy, and Director of the Mineralogical Laboratory.

- HENRY WOOD, PH.D., Associate Professor of German.
WILLIAM HAND BROWNE, M.D., Librarian, and Associate in English.
HENRY H. DONALDSON, PH.D., Associate in Psychology.
LOUIS DUNCAN, PH.D., Associate in Electricity.
FABIAN FRANKLIN, PH.D., Associate in Mathematics.
EDWARD M. HARTWELL, M.D., PH.D., Associate in Physical Training, and Director of the Gymnasium.
WILLIAM H. HOWELL, PH.D., Associate in Biology.
J. FRANKLIN JAMESON, PH.D., Associate in History.
ARTHUR L. KIMBALL, PH.D., Associate in Physics.
EDWARD RENOUF, PH.D., Associate in Chemistry.
EDWARD H. SPIEKER, PH.D., Associate in Latin and Greek.
HENRY A. TODD, PH.D., Associate in the Romance Languages.
PHILIP R. UHLER, Associate in Natural History.
ELGIN R. L. GOULD, PH.D., Reader in Social Statistics.
HERBERT WEIR SMYTH, PH.D., Reader in Greek Literature.
WOODROW WILSON, PH.D., Reader in the Science of Administration.
CYRUS ADLER, PH.D., Instructor in the Shemitic Languages.
ETHAN A. ANDREWS, PH.D., Instructor in Osteology.
BOLLING W. BARTON, M.D., Instructor in Botany.
B. MEADE BOLTON, M.D., Assistant in Pathology.
JAMES W. BRIGHT, PH.D., Instructor in English.
WILLIAM B. CLARK, PH.D., Instructor in Palaeontology.
HENRY CREW, PH.D., Assistant in Physics.
JULIUS GOEBEL, PH.D., Instructor in German.
MARION D. LEARNED, PH.D., Instructor in German.
GUSTAV A. LIEBIG, JR., PH.D., Assistant in Electricity.
CHARLES L. REESE, PH.D., Assistant in Chemistry.
FREDERICK M. WARREN, PH.D., Instructor in French.
HUGH NEWELL, Instructor in Drawing.
CHARLES L. WOODWORTH, JR., Instructor in Elocution.
HARTVIG NISSEN, Instructor in Gymnastics.
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GENERAL STATEMENTS

AS TO THE SEVERAL

COURSES OF INSTRUCTION.

The Johns Hopkins University was opened in 1876 for the instruction of young men in various branches of knowledge. Thus far the Faculty of Philosophy has alone been fully organized, but the formation of a medical faculty has been begun and will soon receive further development. In the Faculty of Philosophy, the instruction is carried on by university methods and by collegiate methods corresponding with the requirements of students at different stages of their advancement. University instruction is offered to those who have already taken an academic degree, or who have otherwise fitted themselves to pursue advanced courses of study. Collegiate instruction is offered to undergraduates, who have the choice of several prescribed courses of study, all of them leading up to the degree of Bachelor of Arts. In the following pages full information is given with regard to the plans which are followed in each of the main departments of instruction.

GREEK.

The instruction in Greek is directed by Professor Gildersleeve. His own courses are given in a Seminary, which consists of the Director, Fellows, and Scholars, and such advanced students as shall satisfy the Director of their fitness for an active participation in the work by an essay, a critical exercise, or some similar test of attainments and capacity. All graduate students, however, may have the privilege of attending the course.

Each regular member is required to take his turn as interpreter, critic, analyst, and special fields of research are assigned according to progress or bent. It may be added that while the Seminary demands a large portion of the student's time, the requirements are not so great as to preclude independent study in other directions, and care is taken so to direct his private reading, that in the usual period of preparation for the higher degree a comprehensive knowledge of Greek literature and Greek life may be gained.

By these arrangements the students are brought into closer relations with the professor and encouraged to perform more independent work and engage in more extended experiments than would be possible on a system of mere recitation or the simple hearing of lectures.

The subjects to which attention has been given during the last decennium are these :

1878-79. Lucian.	1883-84. Greek Historians.
1879-80. Aristophanes.	1884-85. Attic Orators.
1880-81. Attic Orators.	1885-86. Plato.
1881-82. Plato.	1886-87. Aristophanes.
1882-83. Aristophanes.	1887-88. Greek Historians.

The methods followed have been described in successive annual reports, which may readily be consulted.

The centre of work in the Seminary during the past year was Thucydides; for the next year it will be the Attic Orators. The Seminary meets in a room especially devoted to its purposes, where the classical library is arranged and opportunities are afforded for quiet study during the day and evening. This library includes the principal Greek and Latin texts, commentaries, etc., and in the plans for its enlargement, special attention is paid to providing year by year the newer books which are important for current study.

In addition to the work of the Seminary, courses of lectures are given by the Director, and by other qualified persons. For example, during the year 1887-1888, Professor Gildersleeve gave a course of lectures on Greek syntax, extending through the year, and a course of practical exercises in Greek composition, translation at dictation, twice weekly during the first quarter; Dr. Smyth gave a course on Greek historical inscriptions twice weekly through the year, a course of lectures on Greek archæology, weekly through the year, and a public course of four lectures on Greek lyric poetry. In addition to the courses above named, Mr. J. R. Wheeler was engaged to give eight lectures on the topography of Athens, and Mr. W. M. Arnolt gave instruction weekly in New Testament Greek.

Undergraduate students who select the classical group of studies are required to follow the class work in Greek, five hours weekly through two years, in addition to other studies. The texts read vary from year to year, including selections from orators, poets, and historians. Exercises in Greek composition and in reading at sight are likewise required. To extend the acquaintance of the student with Greek liter-

ature, he is obliged to read by himself certain prescribed authors, and to pass an examination upon them. Dr. Spieker, associate in Greek and Latin, has had during the past year, under the guidance of Professor Gildersleeve, a large part in the classical instruction of the undergraduates.

LATIN.

Instruction in Latin is given on a plan similar to that already mentioned as followed in the courses in Greek. The advanced work proceeds through the organization of a Seminary, of which Dr. Warren, Associate Professor of Latin, is the Director. The instruction has two distinct ends in view. It aims first to give students a wider and more accurate knowledge of the Latin language and literature than can be secured in the ordinary college course, so that they may become more efficient teachers; and secondly, to train them in the methods of scientific research, so that they may become independent investigators. It is not believed, however, that these two ends can be kept separate. On the contrary, the most enthusiastic teacher is likely to be one who is thoroughly imbued with the scientific spirit. Accordingly, the most important instrument of training is the Latin Seminary, which meets twice a week during the year. Each year some author or a group of closely connected authors is made the centre of work. Critical methods are taught, interpretations are prepared by members of the Seminary in turn, and papers are read by them containing the results of special investigations on the syntax and style of authors and on other themes, literary and linguistic. The character of the work can be best understood from a summary which has been printed in a separate paper, copies of which can be obtained on application. The subjects treated during the last six years have been as follows:

- 1882-83. Cicero.
- 1883-84. Terence.
- 1884-85. Roman Satirists, especially Horace and Juvenal.
- 1885-86. Roman Historians, especially Livy and Tacitus.
- 1886-87. Vergil.
- 1887-88. Terence.

Courses of lectures are also given from time to time by the Director. For example, in 1887-88 he lectured on Latin Comedy and on Latin Syntax, two lectures weekly during the first half-year; and on Latin Epigraphy, weekly during the second half-year. He also conducted a weekly course of readings in Aulus Gellius, during the second half-year.

The undergraduate work in Latin is also akin to that in Greek. The authors read differ year by year, but are so chosen that the student may become acquainted with historical, poetical, and philosophical authors. His work in the class-room must be supplemented by a prescribed course of reading which he follows privately and on which he undergoes an examination. Latin composition and sight reading form a part of the course. Dr. Spieker has been associated in this work.

SHEMITIC LANGUAGES.

In the Shemitic Seminary, Professor Haupt, Director, instruction is provided in Hebrew, Biblical Aramean, Syriac, Arabic, Ethiopic, etc., and in Assyriology in its various branches (Assyro-Babylonian and Sumero-Akkadian). In the organization adopted in 1883, a course of three years was arranged. The centre of the work is the Old Testament, special attention being given to the critical study of Hebrew texts and the cuneiform inscriptions bearing on the Scriptures. Cyrus Adler, Ph. D., lately Fellow, is the assistant of Dr. Haupt.

Special consideration is given to the needs of four classes

of students ; namely : students of theology wishing to obtain a thorough acquaintance with the sacred tongue and its sister idioms as a means of elucidating Scripture and problems of the comparative history of religion ; students of linguistics intending to make comparative grammar of the Shemitic languages their specialty ; students of Oriental history and archæology desirous of drawing directly from the original sources ; persons looking for instruction in the living Oriental languages (as modern Arabic or Amharic) for practical purposes.

In these various courses, the seminary method is followed throughout, the student being from the first brought face to face with the several idioms, without long theoretical introductions. Stress is laid on a thorough grammatical training, imparted in connection with the minute philological analysis of some selected text in the respective languages, printed grammars serving only for occasional references.

A room has been set apart containing a well equipped working library for all the branches of Oriental research, and some advanced students are usually present to help on the preparations for the recitations conducted by the Director of the Seminary and to furnish any other aid that may be desired.

A statement of the courses given during the last four years is made in a special pamphlet.

SANSKRIT AND COMPARATIVE PHILOLOGY.

The most advanced instruction in Vedic Sanskrit is given under seminary organization (of which Professor Bloomfield is the Director), weekly, through the year. The subject of the work for 1887-88 is The Literature of the Atharva-Veda. The order of themes treated is somewhat as follows :

1. The position of the Atharvan in Vedic literature.
2. Survey of the contents of the published form of the Veda.
3. The çākhās, or schools of the Atharva-Veda.
4. The ritual of the Atharvan.

Dr. Bloomfield has at present in his possession, as loans from the British Government in India and from native scholars, about twenty MSS. bearing upon the ritual practices of the Atharvan. These are open to inspection and study, and afford a somewhat unusual opportunity for handling native materials before they have passed through scholarly criticism. Some of these texts are now being edited by members of the Seminary.

The work of the Seminary is supplemented by courses of reading in the Hitopadeça and Manu, by an introduction to the Rig-Veda, and by practical exercises in grammar and prose-writing.

In Comparative Philology the work is two-fold. First, a course in the general principles of linguistic science, together with an exposition and criticism of modern methods in scientific grammar. Secondly, a comparative study of Indo-European accentuation, with special application to the accent of Greek. The latter course is carried on under seminary organization, with discussions and contributions by the members.

Courses of instruction are annually provided in Sanskrit, in the Comparative Grammar of the Indo-European languages, and in general linguistic science. These courses aim to meet the wants of those who wish to devote themselves to the study of these branches exclusively and for their own sake, *i. e.* those who wish to become Indian philologists or comparative grammarians; and also the wants of students of philology in general who wish to obtain a broader linguistic basis for special studies in other departments of philology.

A prolonged course in Sanskrit, involving two lectures a week during two years, is planned so as to furnish a good knowledge of classical Sanskrit, and to include an introduction into the dialect of the Vedas. This should be supplemented by the course in general linguistic science (one lecture a week during one year, cf. above), and these two courses represent an amount of material sufficient for a subsidiary subject for the degree of Doctor of Philosophy.

The advanced work aims especially to meet the wants of those who wish to make Indian Philology or Comparative Philology their special study. Instruction is given by practical exercises, lectures, seminary work, and where possible, the use of native Indian manuscripts.

A synopsis of the courses offered during recent years (1881-87) (which is printed in the Annual Report for 1887, and in a separate paper), may thus be summarized under three heads :

I. Courses in the general principles of comparative philology or linguistic science, and on special chapters thereof.

II. Courses in the comparative grammar of the Indo-European languages : comparative study of Indo-European vocalism ; comparative grammar of Sanskrit and Zend ; comparative phonology of Greek ; historical and comparative study of Greek accent ; comparative study of Greek inflections ; Greek guttural consonants.

III. Vedic, Sanskrit, Prākṛit : Rig-Veda ; Atharva-Veda ; literature of the Brāhmaṇas ; Kāuṇika-sūtra from the MSS. ; Āçvalāyana's Gṛhya-sūtras ; comparative study of the Gṛhya-sūtras ; law-books of Manu and Yājñavalkya ; Hitopadeça ; Kathāsaritsāgara ; Çakuntala and introduction into Prākṛit ; Nala ; practical exercises in Sanskrit prose ; elementary Sanskrit.

The seminary room of the department contains a well-selected library of books on Indian (Vedic, Sanskrit, Pāli, Prākṛit) and Iranian (Zend, Persian, etc.) literature. Notably, the more expensive lexical works are placed for convenient use of the members of the seminary. The leading periodicals bearing upon these subjects—a number of them published in India and difficult of access—are to be found upon the tables of the seminary. The library of the Peabody Institute also contains a valuable collection of books bearing upon these studies; most noteworthy among them is a full set of the *Bibliotheca Indica*, the largest collection of Vedic and Sanskrit texts, and the *Indische Studien*, the leading special journal devoted to the science of Indian antiquities.

ROMANCE LANGUAGES.

Advanced instruction in Romance Languages is so planned as to cover at least three years, and is directed by Dr. A. Marshall Elliott, Associate Professor of Romance Languages, with the assistance of Drs. H. A. Todd and F. M. Warren. The subjects of instruction are divided into three distinct sections: a purely linguistic, a purely literary, and a composite group (intended to unite the first two), and each of these groups has its special instructor. Every one who intends to take a degree in Romance Languages must work in these three lines, which are so arranged as to supplement one another according to the attainments and bent of the student. The first year is chiefly spent in preparation for seminary work, to which the student is generally admitted, as an active member, at the beginning of the second year. During this preliminary period, a practical knowledge of the principal Romance Languages is acquired (a thorough acquaintance with Latin and Modern French being pre-

supposed), a brief survey is given of the history of the science, together with an introduction to the use of scientific methods in language and literature. With this equipment the student is prepared to begin an appreciative scrutiny of special texts with their critical linguistic and literary apparatus. He is taught to handle his materials with discriminating judgment and, according to his progress, subjects are assigned to him for investigation which tend to develop the patience and the accuracy necessary to a careful investigator. In literature as in language proper, it is particularly to the origins that his attention is directed. By extensive reading required in connection with the subjects taken up, he is made familiar with the different phases of opinion held by leading European scholars, and is thus enabled to control certain parts of his subject within well defined limits. Toward the end of the course the student is expected to concentrate upon some single line of work within his general field. It will be observed, then, that from the outset the student's work in this course is comparative, and that he moves from the general to the particular. In the early part of it, the object is to give a broad basis to work on, by making him sufficiently familiar with the different idioms to use them readily, by way of illustration, in his subsequent studies. Dialect-study and phonology are made essential features of this plan of studies. During the last year (1887-88), the Picard and the Norman dialects have formed, on the French side, the centre of work for first and second year students, and the Gallo-Italic group, on the Italian side, for third year students.

The subjects to which attention has been given in the Seminary for the last five years are as follows:

1883-84. Anglo-Norman Dialect and the Oaths of Strasburg.

1884-85. *Cantilène de Sainte Eulalie* and *Fragment de Valenciennes*.

1885-86. The Franco-Norman Dialect with the Vie de Saint Alexis.

1886-87. The Oaths of Strasburg and the Cantilène de Sainte Eulalie.

1887-88. Old French Paraphrase of the Canticum Canticorum and the Fragment de Valenciennes.

In addition to the work of the Seminary, lectures are regularly given at stated periods of the course: (1) on French phonetics, (2) on Old French syntax, (3) on Romance morphology, (4) on French dialects, (5) on Italian dialects.

The special lectures on literature run through the whole period of three years.

The Seminary meets in a room especially set apart for its use, where the Romance books and journals are collected. The following Journals are accessible to the student:

Zeitschrift für Romanische Philologie, Romania, Revue des Langues Romanes, Herrig's Archiv, Franco-Gallia, Archivio Glottologico, Romanische Forschungen, Zeitschrift für Neufrauzs. Sprache und Litteratur, Französische Studien, Studi di Filologia Romanza, Propugnatore, Giornale Storico della Letteratura Italiana, Neuphilologisches Centralblatt, Literaturblatt für Germanische und Romanische Philologie, Revue de l'Enseignement des Langues Vivantes, Le Canada-Francais, Revue Internationale de l'Enseignement, Le Moyen Age, La Revue Celtique.

Besides these, a special publication, *Modern Language Notes*, is issued monthly by members of the modern language department of the university, in which are represented the most recent literary and scientific phases of linguistic research in the modern idioms.

Undergraduate students who select Romance Languages are required to follow class work for five hours weekly, through two years, during which time they will read extensive selections from modern, middle, and old French texts, and be made acquainted with the general laws of French

phonology and morphology. Private reading is also required of the student, which varies from year to year according to the authors taken up in class.

TEUTONIC LANGUAGES.—ENGLISH AND GERMAN.

In the Teutonic group of studies, under the guidance of Professor Wood, instruction is provided in German and English in all periods, and in the historical development of the more important sister dialects. The advanced courses are arranged according to one plan, with the primary object in view of imparting a thorough linguistic and historical knowledge of the two chief languages of the group. Dr. Browne, Dr. Bright, Dr. Learned, and Dr. Goebel are engaged in instruction. All the courses centre in the Teutonic Seminary and the English Seminary. The seminary method is also followed in most of the other courses. Some one text is chosen and minutely analyzed. In addition, each member of the class is required, from time to time, to present a study of some topic connected with the subject in hand. In assigning such work, both in class and seminary, allowance is made for individual aptitude and bent.

The philological training given is intended not only for those who expect to devote themselves to Teutonic or English philology, but also for students of English literature. Purely literary studies are on an equal footing in the seminaries with linguistic research, and will be equally furthered with counsel and guidance.

The Teutonic Seminary is divided into two sections. In the first section the subjects studied during the last two years have been Old High German and Low German (the whole period from Old Saxon to Plattdeutsch). In the second section the contents of recent journals and books are reported on and discussed, and original papers are read.

In the English Seminary the work during recent years has included Beowulf, the Romantic movement in English literature, the literature of the Elizabethan period. Bi-weekly journal meetings are held, and in them original papers are presented and discussed.

The following is a list of the advanced courses given during the years 1884-1888 ; the numbers appended showing how many times the whole course has been given. All the advanced courses in German were given by Dr. Wood.

German.

Old High German (three times).

Low German : Old Saxon Grammar, Heliand (once).

Low German : Middle and New Low German (Lübben's Chrestomathy and Lauremberg's Scherzgedichte) (once).

Gothic (four times).

Middle High German : Elementary Course (four times).

Middle High German : Parzival ; Nibelungen Lied ; Minnesang's Frühling (each once).

Comparative German Grammar (twice).

Old Norse : Introduction, and Prose Readings (twice).

Old Norse : The Edda (once).

Old Teutonic Life (Lectures) (once).

German Literature in the 16th and 17th centuries (Lectures) (once).

Goethe (Interpretation of selected poems) (once).

English.

Beowulf (three times). Dr. Wood.

Anglo-Saxon Grammar (three times). Dr. Bright.

Middle-English Grammar (twice). Dr. Bright.

Romance of Octavian ; Piers Plowman ; Chaucer (each once).
Dr. Bright.

Anglo-Saxon Poetry : Andreas, Elene, Juliana, Caedmon (once).

Dr. Bright.

Anglo-Saxon Prose : Aelfred's Orosius and Boethius, Aelfric's Homilies (once). Dr. Bright.

Anglo-Saxon Versification (once). Dr. Bright.

Oldest English Texts (Vespasian Psalter) (once). Dr. Bright.

Romantic Movement in English Poetry (18th and 19th Century) (once). Dr. Bright.

Early Scottish Poets (twice). Dr. Browne.

The room in which the Seminary meets is provided with a library sufficient for the prosecution of philological work, and is open to every member during working hours.

The following journals are accessible :

Zeitschrift für deutsches Alterthum, Beiträge zur Geschichte der deutschen Sprache und Litteratur, Germania, Zeitschrift für deutsche Philologie, Alemannia, Quellen und Forschungen, Sanders' Zeitschrift für deutsche Sprache, Anglia, Englische Studien, Herrig's Archiv für das Studium der neueren Sprachen, Schnorr's Archiv für Litteraturgeschichte, Zeitschrift für österreichische Gymnasien, Nordisk Tidskrift for Filologi, Behaghel und Neumann's Litteraturblatt für germanische und romanische Philologie, Roediger's deutsche Litteraturzeitung, Literarisches Centralblatt, Shakespeare Jahrbuch, The Publications of the Early English Text Society, Chaucer Society, Spenser Society, Early Scottish Text Society, English Dialect Society, Ballad Society, etc.

Undergraduate courses are also provided in German and English which may be followed by any students who find the courses adapted to their wants. The authors read vary year by year,—but the instruction is nearly the same in character, and it is so arranged as to meet the needs of beginners of different degrees of intellectual advancement.

In German, undergraduate courses are provided for

(a) Students who take a first and second year's undergraduate course in German.

(b) Students who follow the classical group of studies; one year's course.

(c) Graduates who desire to read German prose at sight, and to write German.

(d) Graduates and undergraduates who wish for conversational familiarity with German.

(e) Candidates for matriculation; study preliminary to entrance to the first year's German course.

In English, the study of the language and literature is carried on under three aspects : the philological, the literary, and the practical.

I. On the language side, the guiding principle in introducing students to this study is that English is one language in all its periods and in all its forms, and that Anglo-Saxon, Early and Middle English are only earlier stages of Shakespearian English.

The study of Anglo-Saxon is therefore begun at once, and the forms and syntax are explained from the resources of English itself in its later periods. The attempt is made in this way to replace the empirical English grammar of the school by a real grammar, which shall be learned historically, in Anglo-Saxon, and in Chaucerian and Elizabethan English.

Attention is paid to enlarging, systematizing, and fixing the student's English vocabulary ; and the study of words is entered upon as far as seems expedient.

The attempt is made to bring students to a point where they will claim Early English as their natural possession, and in some degree know it to be such, rather than to train them to a superficial knowledge and dexterity in handling strange forms.

The elements of English Phonetics are also learned during the first year, and the history of the language is passed in review.

In the second year's course the study of Anglo-Saxon is continued in the best monuments in prose and poetry, and historical English grammar is taught as a whole. The dialects of Early English are studied in their representative works.

II. In the literary aspect, English literature is studied as the continuous exponent of the best thoughts and feelings of the race, and its continuity and representative character are always kept in view. With the less advanced students this study is pursued in a somewhat synoptical manner by tracing the stream of English literature from its beginnings, in the works of its chief writers, portions of which are read by the instructor, or by the class under his guidance, with necessary elucidations. The development of style and changes in language are explained so far as seems expedient ; the object aimed at being to give the student such a general knowledge of the whole body of the literature, that thenceforth no part of it will seem alien to him.

With more advanced students a similar plan is pursued, but with more detail and precision. An important period or group

of writers is studied, with some representative writer as the central figure. The historical events of the time, the manners and customs, the political and religious movements, the position of men of letters, and their relations to the rest of society, etc., are reviewed as preliminary to the study of the texts. The work selected as central is then studied with critical care, and correlated with the events of the time and with contemporary literature.

III. The third, or practical aspect, looks to English as an organ of expression; and the object aimed at is to help the student to know good writing from bad, and to acquire the power of expressing himself in clear, sound, manly English. To this end, writers of acknowledged excellence are read, and the reasons of their excellence pointed out. Original papers are also submitted to the instructor, who, in his comments, does not limit himself to correcting errors and noting defects, but also endeavors to explain and illustrate the principles of good writing.

The *American Journal of Philology*, edited by Professor Gildersleeve, is now in its ninth volume. It covers the whole field of classical and modern philology.

HISTORY AND POLITICS.

The work of this department is under the direction of Dr. H. B. Adams, aided by Messrs. Emmott, Ely, Jameson, Wilson, and Gould, and such occasional lecturers or additional instructors as may be found necessary. As at present organized, the work of instruction aims to accomplish three main results:

1. The preliminary training of students, both graduate and undergraduate, to such a knowledge of the essential facts and principles of general history and politics, as will contribute towards a liberal education, and serve to fit men to pursue advanced courses in special branches of these sciences, with a view to taking the doctor's degree, or to entering the study of law or some branch of the civil service.

This training-process is pursued in undergraduate classes, where systematic and positive instruction is given by means of required text-books, lectures, essays, oral reports, and constant drill. The work extends, in its various sections, over a period of three years (see College Courses, Sixth Group, in Register). Graduates of other institutions who have not had the equivalent of the preliminary courses in History and Politics are expected to make up their deficiency by extra work in undergraduate classes.

2. Advanced instruction in history, economics, historical and comparative jurisprudence, historical criticism, methods of research, historiography, politics, administration, social science, and statistics, for graduates, or special students of mature years, if qualified by ability and previous studies to pursue such courses. Undergraduates, pursuing a course for the bachelor's degree, are not allowed to take graduate work. Advanced instruction is given chiefly by lectures, accompanied by private readings on the part of the students, and by frequent examinations, both oral and written, upon the special topics presented for consideration.

(a.) In a three years' course upon the History of Politics, Dr. Adams presents each year characteristic phases of the ancient and the modern State, by means of representative courses of lectures, with required examinations upon the same and upon private reading in assigned fields. The first year is devoted to the early history of institutions and to Greek politics, the first semester, and to the history of Prussian politics, the second semester. The second year, first half, is given to Roman constitutional history, and, second half, to French absolutism. The third year, the two centres of instruction are Germanic federations and Anglo-American institutions. Each year's work is independent and complete in itself.

(b.) Mr. Emmott offers a three years' course in Historical Jurisprudence, with the following subdivisions, each completed in one year: history and principles of the Roman law; comparative jurisprudence of the principal European systems; history of the English law of real property.

(c.) Dr. Richard T. Ely gives to graduates and specialists advanced instruction in Political Economy, extending through a period of three years, and relating to the history of economics, money, banking, finance, commerce, social and industrial problems, such as the management of railroads and corporations.

(d.) Dr. J. F. Jameson has developed a systematic course of three years' instruction for graduate students in Modern Historical Criticism, Modern Historiography, and Modern Methods of Historical Research. He is also developing, in an independent way, the history of the United States and of the individual States, from the formation of the Federal Union. In lectures and original studies he covers, in each annual and progressive course, a period of four years.

(e.) Dr. Woodrow Wilson has been engaged for a three years' graduate course in Administration and Comparative Politics. Among other topics, he considers: the general principles of administration as illustrated in the central and local governments of France, Germany, England, Switzerland, the United States, and Italy; the administration of civil justice; town and city government; sanitation and poor relief; financial administration; education; reorganization; responsibility; control. Each year's course is complete in itself.

(f.) Dr. E. R. L. Gould, Expert in the U. S. Bureau of Labor, will give occasional short courses of practical lectures upon concrete problems of Social Science, and upon Economic and Social Statistics, with illustrations by graphical methods.

3. The development of a spirit of original research among the more advanced members. This end is attained chiefly in individual ways, by the constant association and coöperation of students and instructors, not only in advanced classes and in various fields of special work, but in an organized society called the Seminary of History and Politics, meeting in its own special library one evening each week for the report and discussion of original studies. For several years the scientific researches of members of the Seminary have been more especially in local fields of American institutional and American economic history, but there is now a growing tendency to extend inquiries into the broader domain of comparative politics and economics. The best results of original and organized inquiry by this department have been published in nine volumes of "Historical Studies." Recently, under the direction of Dr. Adams, the history of higher education in individual States on the Southern Atlantic seaboard has been written by students representing those States. The results will soon be published by the U. S. Bureau of Education, and an extension of the work of historical inquiry into States in the Northwest and Southwest is now proposed. Under Dr. Ely's guidance, special attention has recently been given to comparative studies in finance, and to the history of taxation.

Library Facilities.—The department of History and Politics occupies at present several rooms in the story immediately above the main library, with which it has a double connection. In the main library are kept general works of reference, standard literature, ancient and modern, and some of the chief authorities in the general fields of history, philosophy, art, and science. Here also is a "New Book Department," in which are exhibited recent publications of scientific value in French, German, or English. The leading

periodicals of various countries are to be found in the main library, which serves also as a general reading-room for the entire university. In the historical rooms above are grouped the more special collections of books, pamphlets, and periodicals relating to history and politics. The largest room, 51 x 29 feet, is exclusively devoted to graduate work and contains the best part of the Seminary library. Here is the Bluntschli collection of law and politics, with many valuable manuscripts on Swiss customs obtained from the family of the Heidelberg professor. Here, too, are some of the manuscripts of Francis Lieber. American and European history, political economy, international law, the science of government, administration, social science and statistics, are the principal fields from which materials have been gathered for seminary-use. Altogether the seminary collection numbers about 12,000 volumes. Lectures to graduates and seminary-exercises are held amid an environment of books. Undergraduate classes have their respective rooms, with an equipment of maps, diagrams, and works of reference for class use. Instructors have their private offices where, at certain hours, they may be consulted by their students. The department has its special librarian, Mr. J. M. Vincent, who gives such assistance as may be needed in the use of books, and who lectures upon library administration and literary methods. Among the library-facilities of the department should be mentioned the easy access of students and instructors to the valuable collections of the Maryland Historical Society, the Mercantile and Law Libraries, the Whittingham Library (especially rich in Church History), the Pratt Public Library, and the Peabody Institute, which contains 90,000 volumes and is especially rich in the sources of European history.

Visits are occasionally made to Washington for the consultation of the Congressional and other libraries.

MATHEMATICS.

The more advanced courses in Mathematics vary from year to year, and are so arranged that a student who remains here two or three years may receive continued and systematic guidance in any one of several directions. The head of this group is Professor Simon Newcomb, whose personal instructions are given chiefly in theoretical and practical Astronomy. The courses in pure mathematics are given by Associate Professors Story and Craig, with the co-operation of Dr. Franklin, and with such other assistance as may be requisite. Subjects in mathematical physics are treated by Professor Rowland. The less advanced subjects in mathematics are nearly the same every year.

Students properly qualified have open to them the following courses :

In *Arithmetic, Algebra, and Geometry* :

Theory of Higher Plane Curves.
Solid Analytical Geometry.
Modern Algebra.
Theory of Numbers.
Quaternions.

In *Analysis* :

Theory of Functions.
Linear Differential Equations.
Abelian Functions.
Elliptic Functions.

In *Astronomy* :

Spherical Astronomy.
Practical Astronomy (with use of instruments—see beyond)
History of Astronomy.
Computation of Orbits.
Perturbations.

In *Applied Mathematics* :

Hydrodynamics.
Theory of Elasticity.
Theoretical Dynamics.
Problems in Mechanics.

In *Mathematical Physics* :

Theory of Light.
Thermodynamics and Conduction.
Electricity.
Magnetism.
Theory of Sound.

Undergraduates are annually instructed in :

Advanced Algebra (introductory to the Calculus).
Theory of Equations.
Conic Sections.
Differential and Integral Calculus.
Differential Equations.
Solid Analytic Geometry.

Seminary work is carried on by Professor Newcomb, Dr. Story, and Dr. Craig.

The principal books and journals relating to pure and applied mathematics are arranged in a special library convenient to the classrooms. All the leading mathematical journals are regularly received, besides the publications of learned societies abroad and at home. Complete sets of the *Comptes Rendus*, *Philosophical Magazine*, *Crelle*, *Mathematische Annalen*, *Acta Mathematica*, *Grunert*, *Poggendorff*, etc., are accessible.

The university has a collection of about two hundred and thirty geometrical models, illustrating the forms of mathematical solids, surfaces, and curves, their singularities and varieties, and the methods of descriptive geometry by which they are represented on a plane.

The *American Mathematical Journal*, founded by Pro-

fessor Sylvester, and edited in recent years by Professor Newcomb and Dr. Craig, has nearly completed its tenth volume.

ASTRONOMY.

The instruction in Astronomy is given by Professor Simon Newcomb, and includes a study of the principles of the science, illustrated and enforced by practical exercises. Different branches of the subject are taken up in different years. Before the present year it was taught only as a subsidiary subject, and a student generally took up but a single branch, either Spherical Astronomy or the elements of Celestial Mechanics. In 1887-8, the courses were so extended as to cover the ground required to make it a principal subject. The general plan of work is now as follows :

One year of the course, generally but not necessarily the first, is devoted to Spherical and Practical Astronomy, the Theory of Instruments with the principles which underlie their use, and the history of the science. During the year 1887-8, Chauvenet's Manual was the text-book in the first-named subject. For instrumental practice a small meridian circle has been procured, which is provided with nearly all the accessories accompanying the largest instruments, so that the student may make himself practically acquainted with their use. An equatorial telescope of $9\frac{1}{2}$ inches aperture is also among the instruments provided for practical work.

Among the subjects very fully treated during the present year were the theories of precession and nutation, with their application to the reduction of places of the fixed stars, the development of functions in periodic series, the theory of errors, and the method of least squares. The seminary course in the history of astronomy included readings from

and comments on the *Almagest* of Ptolemy, a general review of the works of the leading astronomers of ancient and modern times, and an account of the successive steps by which the instruments of the astronomer were brought to their present state of perfection.

It is intended that another year shall be devoted principally to Celestial Mechanics, the computation of perturbations, and the correction of orbits, using Watson's *Astronomy* as the text-book. The third year may be devoted to such special researches as the taste and aptitude of the student may lead him to engage in.

PHYSICS.

The instruction in Physics is under the charge of Professor Rowland, Director of the Laboratory, with the aid of Drs. Kimball, Duncan, and Crew.

The courses in Physics are designed to afford suitable instruction and guidance for all classes of students, from those just beginning the study to those already prepared for advanced work. Courses are also provided in applied electricity, of which an account is given beyond.

The laboratory is a handsome and commodious building, 117 feet long by 71 feet wide, with four working floors, besides the basement. Beneath the basement are constant temperature vaults, for the dividing engines used in ruling gratings for optical purposes, and comparators for measuring lengths. In the front part of the basement are the instrument shops, and the engine and dynamo rooms. In the rear are the battery room and rooms for investigations in electricity and magnetism; this part of the building contains no iron. On the first floor are the main lecture-room, two rooms for heat experiments, and the rest of the space is used

for work in electricity and magnetism. The second floor contains the director's study and library, the general library, mathematical lecture-rooms, and studies. On the third floor are the elementary laboratories and studies. The fourth floor is specially fitted up for investigations in light, including a balcony for heliostats, spectrometer and photographing rooms, and other ample facilities for work on spectroscopy and for special investigations in light. On the roof is a platform for open air experiments, and the tower is surmounted by the dome of the astronomical observatory.

The physical apparatus includes, besides a full equipment for lecture purposes, a very complete and valuable collection of instruments for measurement and research. Many of these have been made from special designs, others have been purchased from European and American makers ; all of them have been carefully selected to accomplish the purposes for which they are intended.

The laboratory is peculiarly well furnished for carrying on investigations in electricity and magnetism and in light.

A circular containing the plan of the building with a somewhat detailed statement of its instrumental equipment, will be sent on application.

The mathematical and physical library of the university is placed in the laboratory, so that it is easily accessible at any time. About seventy different periodicals, including the more important journals published on such subjects, in English, French, German, and Italian, are here kept on file : —among them

London, Edinburgh, and Dublin Philosophical Magazine, American Journal of Science, Wiedemann's *Annalen und Beiblätter*, *Journal de Physique*, *Annales de Physique et de Chimie*, *Comptes Rendus*, *Nature*, *Exner's Repertorium der Physik*, *Philosophical Transactions*, *Proceedings of the Royal Society*, *London Engineering*, *Railroad and Engineering Journal*, *Electrician*, *Electri-*

cal Review, *La Lumière Electrique*, Proceedings of the Cambridge Philosophical Society.

The following is a general view of the courses that are offered :

First Year (Minor) Course.—This course is intended for undergraduates who are taking up the subject for the first time, or who have only studied it in a very elementary manner. A knowledge of plane trigonometry (at least extending to the solution of right-angled triangles) and of the use of logarithms is required for entrance on this course.

Lectures and recitations are continued through the year on Mechanics, Sound, Heat, Light, Electricity, and Magnetism,—accompanied by regular work in the laboratory, in which the student carries out simple experiments illustrating the facts and principles considered in the classroom.

Second Year (Major) Course.—This course is designed to meet the wants of both graduates and undergraduates who have already taken either the first year's course or its equivalent, and who wish to pursue further their physical studies. A working knowledge of analytic geometry and calculus is required for admission to this course. The student, during this year, continues his laboratory work and follows lectures and recitations on the following subjects:—

Dynamics, beginning with the study of the particle and extending to some of the simpler problems in the motion of a rigid body.

Elementary Thermodynamics, based on Maxwell's Theory of Heat.

The Theory of Electricity and Magnetism.

The Relation of Sound to Sensation, based on the "Tönempfindungen" of Helmholtz.

The Wave Theory of Light, with special reference to interference and diffraction, and the various phenomena of polarized light in crystalline media; and the theory of optical instruments.

The laboratory work of this year includes problems that present more experimental difficulties than those undertaken during the

first year, or involve more mathematical knowledge for their complete discussion; written reports are required as in the first year's course. Usually during the year special problems will be assigned to the students, which they will be expected to work out in a complete manner, taking necessarily more time than is required for the ordinary problems of the course.

Advanced Work.—Advanced courses are provided for those students who propose to devote themselves to the study of Physics, either as teachers or investigators. Such students devote a large part of their time to work in the laboratory, where they have the direct supervision of the instructors, at first carrying out experiments which familiarize them with the more important instruments used in research, with the precautions necessary to obtain the utmost accuracy in using instruments of precision, and with general experimental methods; afterwards taking up, under the guidance of the instructors, some research designed to be of permanent value.

An effort is made to render the laboratory as useful as possible to advanced students and investigators. Those who are prepared for such work will have the facilities which it affords placed most freely at their disposal, and will receive every assistance that the instructors can give.

Advanced students are expected to give as much of their time as possible to work in the laboratory.

The following courses of lectures in Mathematical Physics are given:

Courses, continuing through two years, are given in Thermodynamics, Heat Conduction, Physical Optics, Electricity, and Magnetism. These lectures develop fully the mathematical treatment of the subject, and to follow them the student should have sufficient mathematical knowledge to read such authors as Maxwell, Thomson, Stokes, Green, Fourier, etc.

Shorter courses are given in Hydrodynamics, Theory of Elasticity, Theory of Sound, Mechanics, Problems in Mechanics, etc.

The advanced students meet with the instructors once a week for the reading and discussion of the current physical journals. In this way the student becomes familiar with the progress of the science in different parts of the world, and with the questions which are exciting the attention of physicists.

APPLIED ELECTRICITY AND MAGNETISM.

Instruction of Electrical Engineers.

By the completion of the new laboratory, the university is enabled to make arrangements for the education of Electrical Engineers. Their instruction, under the general supervision of Professor Rowland, is directed by Louis Duncan, Ph. D., a graduate of the U. S. Naval Academy and of the Johns Hopkins University, who was for several months chairman of the Testing Committee in the International Electrical Exhibition at Philadelphia.

Rooms and Apparatus.—The basement and most of the rooms on the first floor of the laboratory are set apart for work in Electricity and Magnetism. In addition to its other instruments, the university has recently acquired by gift and purchase a large number of engines, dynamos, and pieces of apparatus indispensable for such studies. Among the more important the following may be named :

Straight line engine (eighteen horse power).

Gas engine (two horse power).

Tatham mechanical dynamometer.

Edison shunt wound dynamo.

Siemens alternating dynamo with exciter.

Gramme permanent magnet dynamo.

Sprague motor (two horse power).

Sprague motor (one horse power).
Sprague motor (one-half horse power).
Baxter motor (one horse power).
Eddy motor (one-half horse power).
Electric lamps, arc and incandescent.
Photometers.
Electro-dynamometers.
Galvanometers.
Quadrant electrometers.
Absolute electrometer.
Resistance boxes.
Weston shunt wound dynamo.
Brush series wound dynamo.
Siemens series wound dynamo.
Forty-five storage cells.
Standard resistances.
Powerful electro-magnets.
Jenkins' form Wheatstone bridge.
Fleming's form Wheatstone bridge.
Magnetometer.
Earth inductors.
Thomson's potential and current galvanometers.
Thomson's electrostatic voltmeter.
Fixed resistance for measuring heavy currents.

Methods of Instruction.—A special course is arranged for advanced students who have completed a general education and who wish to study the theory and applications of electricity.

While a knowledge of the theory is important in every branch of applied science, this is especially the case with electricity, in which the applications increase so rapidly and the practice so frequently changes, that without sound theoretical knowledge it is impossible to keep abreast of the advance of the science, or even to understand the inventions which are daily made public. Yet theoretical knowledge is unfruitful without knowledge of the means of its application, such as can only be obtained by experimental work.

The course, then, is intended to teach the theory of elec-

tricity with a special view to its practical application, to familiarize the student with electrical instruments and methods of experiment, and to give him a knowledge of the theory and practice of those applications that are in successful use and with which he will probably come into contact.

The instruction extends through two years and includes lectures on theoretical and applied electricity, with constant laboratory work. The lectures aim to give a clear working knowledge of the science, while in the laboratory the student receives what help and instruction he may need, yet at the same time he is taught to depend upon and think for himself, and is given every encouragement for the undertaking of original work.

To follow the course the student should have a knowledge of mathematics through the differential and integral calculus. An acquaintance with French and German is most desirable.

First Year.—The lectures will present so much of the physical and mathematical theory as is considered useful for application. The mathematical treatment follows Mascart and Joubert's "Electricity and Magnetism." There are three lectures each week.

The laboratory work will include measurements of resistance, current, potential, capacity, etc., with voltameter and calorimeter work, and the student will be familiarized with the instruments used in electrical measurements, galvanometers, electro-dynamometers, resistance coils, condensers, etc. On finishing this work, the student will be given experiments, such as the construction and measurement of standard cells, the determination of the magnetism of iron, the determination of specific inductive capacity, etc., which will bring into use the methods he has already studied. He will then be given practical work with dynamos, motors, etc. There will be a weekly meeting for the purpose of dis-

curring articles of interest appearing in the electrical journals.

Besides the work in electricity, lectures in mathematics, chemistry, and such other subjects as the student requires, may be followed.

Second Year.—In the second year the theory of dynamos, motors, the transmission and distribution of energy, the telegraph, the telephone, storage batteries, alternating current systems and apparatus, etc., will be discussed.

The laboratory work will continue the tests and running of dynamos and motors, the efficiency and practical working of secondary and primary batteries, photometer work, testing of telegraph lines, experiments on the electrical transmission of energy, telephone work, etc., with such original investigations as the student is able to carry on. There will be a weekly meeting for the discussion of the current literature of the subject.

The student will have time for other selected studies, and in either the first or the second year of this course he must take the advanced course in General Physics (elsewhere designated as the major course for undergraduates), or its equivalent.

At the end of the second year a final examination will be held, and on passing it the student will be given a certificate stating that he has pursued the course in applied electricity and has passed the required examinations.

For the theory of the subject the works of the following named authors are used for reference: Mascart and Joubert, Faraday, Maxwell, De la Rive, Noad, Niederman, Mascart, Thomson, Joule, and others.

In the study of the applications the works of S. P. Thompson, Preece, Prescott, Du Moncel, Joubert, Hopkinson, Kapp, and others are referred to, with many technical papers that have been published in different journals or read before various societies.

There being no provision in this country for the accurate comparison of electrical standards and apparatus, it has been decided to provide means for such measurements here. The comparisons will be made by Dr. G. A. Liebig, Jr., Assistant in Electricity, under the supervision of Professor Rowland and Dr. Duncan.

The measurements that will be undertaken are the comparison of resistances, potential, current, measuring instruments, capacities, the efficiencies of dynamos and motors, the constants of batteries, cables, etc.

CHEMISTRY.

The instruction in Chemistry is under the charge of Professor Remsen, Director of the Laboratory, with the coöperation of Dr. Morse, Sub-director, Dr. Renouf, First Assistant, and other aids.

The Chemical Laboratory is a well-equipped building which was enlarged and put in its present condition in 1883. In it there are eighty-five working desks, so arranged as to accommodate about one hundred and twenty students. There are two large working rooms devoted to general and analytical work, and one somewhat smaller intended for those who are engaged in research. Besides these there are smaller rooms devoted to special objects such as gas analysis, spectrum analysis, combustion, furnace operations, etc. There is an excellent library in the laboratory building always open during the working hours. It contains full sets of all the important chemical journals, as :

Annalen der Chemie, Berichte der deutschen chemischen Gesellschaft, Journal für praktische Chemie, Annales de Chimie et de Physique, Journal of the (London) Chemical Society, Jahresbericht über die Fortschritte der Chemie, Wagner's Jahresbericht über chemische Technologie, etc.

It also contains the principal text-books, and other publications relating to chemistry.

The instruction is adapted to all grades of students from the beginner to the candidate for the degree of Doctor of Philosophy. The higher or graduate work is based upon that given in the two years' undergraduate course, and those graduates of other colleges who have not followed courses equivalent to this, begin with that part of the undergraduate work which appears to be best suited to their needs. The following outline of the work from the beginning will give a general idea of its character.

Undergraduate work : First year.—From five to six hours each week through the year are given to laboratory practice under the direction of competent instructors. Three lectures are given each week by Professor Remsen, and two reviews on the subjects treated in the lectures and on the laboratory work are held by Dr. Renouf. The ground covered by this course is approximately that laid down in "An Introduction to the Study of Chemistry," by Ira Remsen (Holt, New York), which is the text-book used.

Undergraduate work : Second year.—In this year the same amount of time is given to the laboratory as in the first year. The guide used will next year be an abbreviation of the "Experiments in General Chemistry and Introduction to Chemical Analysis," by Jacob Volhard and Clemens Zimmermann, translated by Edward Renouf. The object in view is to give a more complete knowledge of the phenomena of chemistry than is given in the first year, and at the same time to clear up the ideas already gained. To some extent qualitative analysis is taken up, but only for the purpose of aiding in the instruction in chemical principles. The making of preparations both of inorganic and organic compounds will hereafter play a more important part than heretofore.

Besides the laboratory practice the course includes two classroom exercises each week in general Inorganic Chemistry, based largely upon the laboratory work and conducted by Dr. Morse; two lectures on the Chemistry of the Compounds of Carbon, by Professor Remsen, based upon his "Introduction to the Study of the Compounds of Carbon" (Heath, Boston); and one review on the latter subject conducted by Dr. Renouf.

Graduate work.—The work of graduates is carried on in the laboratory more largely than that of undergraduates. The object at first sought for is the perfection of the students in the use of analytical methods. The subject of qualitative analysis is taken up thoroughly after a careful study of reactions as laid down in the Introduction to Chemical Analysis by Volhard and Zimmermann, while at the same time the study of general chemistry is continued. A prolonged course in quantitative analysis, including gas analysis, follows. The analytical work, which is largely under the supervision of Associate Professor Morse, requires about a year and a half for its completion. After this an opportunity is given for the preparation of a variety of compounds involving methods of general importance, or illustrating important classes. The course in the preparation of organic compounds is that laid down in Remsen's "Introduction to the Study of the Compounds of Carbon," supplemented by selections from Levy's "Anleitung zur Darstellung organischer Präparate." During the last year of the work the student generally undertakes some investigation under the guidance of the professor, and, in case he is a candidate for the degree of Doctor of Philosophy, his thesis is based upon the results obtained in the course of the investigation. The essential parts of the thesis are afterwards published in the *American Chemical Journal*.

Lectures on different topics are offered to graduate students in different years. During the year 1887-88, a course of two lectures a week on Theoretical Chemistry was given by Professor Remsen, based upon his "Principles of Theoretical Chemistry" (Lea Brothers & Co., Phila.). There was also a course of between twenty and thirty lectures in the field of Historical Chemistry, in which the advanced students as well as the instructors took part, each one working up an assigned topic and presenting the results in the form of one or more lectures. Weekly meetings were held to hear reports upon the contents of the important journals of chemistry. Reports were furnished in turn by most of those who attended these meetings. Next year, 1888-89, Professor Remsen will give a course of two lectures a week on Advanced Organic Chemistry instead of the course on Theoretical Chemistry given during the present year. The historical course and the journal meetings will be continued. Dr. Morse will also give some lectures upon topics suited to the needs of the more advanced students.

While in the courses outlined above the books mentioned are used as the guides, it must not be concluded that the instruction in any case is confined to what is presented in the book. Students are constantly referred to the journals and other publications in which there are articles bearing upon their work. Further, the chief instruction in every course is that which is given in the laboratory.

As regards the time required by a graduate student to do the work for the degree of Doctor of Philosophy, it can only be said that one who has the necessary qualifications can do it in three years after having such a course as that which is given to the undergraduates of this university who follow chemistry for two years. Those who have not had this preparation will generally require a longer time. There are

no stereotyped courses which lead to the higher degree, and it is impossible to say exactly what must be accomplished to attain it. What is desired is a certain maturity of mind with reference to the science of chemistry, and an ability to deal with chemical problems intelligently. This condition of mind is reached, if reached at all, by long-continued laboratory training accompanied by careful study of the journals of chemistry. It may be said finally that the arrangements of the laboratory are made mainly with reference to those who desire to take up the study of chemistry in a broad way, and that those who want short courses in special branches of chemistry are not advised to come here. It is believed that whatever object the student may have in view, whether he intends to teach or to follow some branch of applied chemistry, the best preparation he can have is a thorough training in the pure science.

The *American Chemical Journal*, edited by Professor Remsen, is now in its tenth volume.

MINERALOGY AND GEOLOGY.

The instruction in Mineralogy and Geology is given by Dr. George H. Williams, Associate Professor of Mineralogy, who followed the courses of Professor Rosenbusch in Heidelberg for three years, and received from the University of Heidelberg the degree of Doctor of Philosophy in 1882. He is assisted in Historical Geology and Palaeontology by Dr. William B. Clark, who received the degree of Doctor of Philosophy at Munich in 1887.

For the work of this group of students a separate building (No. 610 North Howard St.) has been set apart, where the specimens, books, and instruments are brought together. This laboratory is open daily from nine o'clock a. m. to five o'clock p. m.

The advanced mineralogical course embraces lectures (throughout the year) on crystallography, on optical and general physical mineralogy, and on the description of mineral species. Abundant opportunity is also given to students for forming a practical acquaintance with the minerals treated of in these lectures. For such as desire to devote more time to this subject, facilities and instruction are offered in crystal-measuring, calculation, drawing, and projection, as well as in the practical determination of the optical and other physical constants of crystals.

The course in inorganic geology embraces lectures on petrography and dynamical geology. In these the methods and aims of the recent work on the crystalline rocks are treated in considerable detail. The system of classification followed for the massive rocks is essentially that of Rosenbusch. These lectures are, however, principally intended to guide and supplement the laboratory work in petrography, by which students are made practically acquainted with the modern methods of study.

Dr. Clark will supplement the instruction in inorganic geology by a brief course of lectures on historical geology.

After students have become familiar with the methods of petrographical investigation by the study of typical and described material, they are encouraged to undertake original work. The results of a number of such investigations, which have been carried on in the Petrographical Laboratory, have already been published and others are now in progress. Since the extreme importance of field work in connection with the laboratory study of rocks is fully appreciated, the unusually interesting and varied area of crystalline rocks occurring near Baltimore has been divided into sections five miles square, as described in the *Johns Hopkins University Circulars*, No. 59. One of these sections or sheets

may be assigned to a student for study, and his results, in the form of a very detailed geological map accompanied by complete descriptions of the rocks, microscopical and otherwise, may be presented as a doctor's thesis. The weekly journal meetings, for the purpose of acquainting advanced students with current geological literature, form an integral part of this work.

The nucleus of the mineral cabinet is a collection made by Professor O. D. Allen, of the Sheffield Scientific School, New Haven. This collection numbers 1600 specimens, all of small size, but very choice and typical. Nearly all the commoner mineral species are present in specimens from well known localities, both in this country and Europe, while certain American localities are represented by almost unique suites. The cabinet has been increased by the Root Collection, from Clinton, N. Y., and by numerous gifts and purchases. The collection of the Maryland Academy of Sciences has recently been presented to the university. In the possession of the university and in the private collections of Dr. Williams, there are now about 2500 microscopic rock-sections and 3500 hand specimens. These represent very carefully selected material from the most thoroughly studied localities of both Europe and America, and many of them form suites of type-specimens valuable for study and comparison. Among those belonging to the university may be named :

Stürtz collection of typical European rocks, described by Rosenbusch;

Hitchcock collection of New Hampshire rocks, described by Hawes;

Collection of European rocks made by Mr. E. Sanger;

Collection of Baltimore County rocks, described by Dr. Williams;

Collection of Crystalline Rocks from the Lake of the Woods region, made and presented by Mr. A. C. Lawson, of the Geological Survey of Canada.

In addition to the possessions of the university, private collections of Dr. Williams and Dr. Clark are also accessible.

The geological and mineralogical library is furnished with the principal books of reference and journals. The fine geological library at the Peabody Institute supplements that in the possession of the university, especially in palaeontology. The university owns a large goniometer, several microscopes made especially for rock study, apparatus for making separations of rock constituents and for preparing rock-sections. It also owns the more important pieces of apparatus for work in physical mineralogy, together with a complete suite of wooden and glass crystal models.

For the use of workers in the field the following publications will be found useful:

An Excursion Map of Baltimore and its Neighborhood, prepared for the Naturalists' Field Club. Issued by the Publication Agency of the University. Price \$1.00.

Notes on the Minerals occurring in the Neighborhood of Baltimore. By Dr. G. H. Williams. Issued by the Publication Agency of the University. Price 35 cents.

Bulletin No. 28, U. S. Geological Survey, containing colored plates and a map, and giving extended petrographical studies of many of the rocks near Baltimore. By Dr. G. H. Williams. Price 10 cents.

BIOLOGY.

The instruction in Biology is directed by Dr. H. Newell Martin, Professor of Biology, with the assistance of Dr. W. K. Brooks, Associate Professor of Morphology, and Drs. Howell and Andrews.

The Biological Laboratory, a four-story building of eighty by fifty-four feet, was opened in 1884. It contains large rooms for general and undergraduate work, and workrooms for advanced students or those engaged in research; also

special rooms for chemical physiology, electrical physiology, micro-photography, myograph work, and advanced histology. In the laboratory is a library containing sets of all the important biological journals and a large number of text-books and books of reference.

In connection with the biological department, a Marine Laboratory has been opened, under the direction of Dr. Brooks, for several months each year since 1879. The material accumulated is now being worked up for publication, and the Marine Laboratory will not be opened during this year.

The regular biological course continues for five years ; of this period two years are undergraduate work leading (with other studies) to the degree of Bachelor of Arts ; three years are graduate study which may lead to the degree of Doctor of Philosophy. A student takes one or more of these years of biological study according to the object he has in view : if he desire merely some training in an observational science he takes only one year ; if he desire to prepare himself to enter a medical school or to get training in experimental science he takes the second year's work also ; after completing the studies of the second year he selects special departments of biology (as a graduate) in accordance with his aims in life.

The general principle which governs the whole plan of the regular biological courses of instruction is to commence with the simplest organisms and the broadest generalizations, and thence gradually to specialize. This specialization ends, however, before the student enters upon the study of minute technical subdivisions of biological science, as, for example, the medical applications of physiology, the applications of bacteriology to the theories of the causation and prevention of disease, the study of insects injurious to plants, the suc-

cessful breeding of domestic animals, and so forth. One great object of the course is, by a good preliminary training in general biological science, to enable competent students quickly and thoroughly to master the facts of technical, or as it may be named, "applied" biology.

An undergraduate student enters upon his biological studies at the commencement of his second year after matriculation, and when he has already had a year's training in Physics and Chemistry. The main part of the work during this year is a study of the fundamental facts of Biology; the relationships and comparison of living and not-living matter; the structure and activities of typical plants and animals of higher and lower organization; the principles of classification; the evolution of complex living species from less specialized ancestors; the origin of all the higher plants and animals from a single cell, and the gradual evolution of tissues and organs during development.

In order to make use of the peculiar value of biological studies in training younger students to observe accurately, at least five hours of laboratory work each week are required throughout the year, and in addition the human and some other typical skeletons are examined minutely by the class; while in the spring there is a two months' course in the elements of structural and systematic Botany.

During the second year of biological study the student takes up vertebrate anatomy and histology, and the elements of zoölogy. In addition he must either take a course (three lectures weekly for six months) in animal physiology, or a course in animal morphology: the earliest permitted specialization of biological studies thus commences. He must also spend at least six hours a week on practical studies in the laboratory throughout the year. A third permissible line of specialization commencing at this stage, namely Botany, has

always been contemplated since the organization of the biological department, but at present is not available to students.

A student who has satisfactorily completed the second year's work in biology and who has elected animal physiology as his more special study, is prepared to enter upon the professional medical study of applied physiology, or of morbid histology, or of pathology, should he enter a medical school.

The postgraduate courses, those of the third, fourth, and fifth years, cannot well be described in precise terms, as they vary greatly with the aims of various students; some desire to become teachers, others to devote their lives to biological research; still others to prepare themselves for technical studies. In general it may be said that during the first of these years the student is required to read more advanced text-books than he studied in his undergraduate course; to repeat some good research and endeavor to improve it; to take part in journal club readings, from current biological journals, which tend to teach him that all science is not contained in text-books, and that the experiments and conclusions of every worker are open to improvement and revision. Advanced lectures, which vary in topic from year to year, are also given by the instructors; and some classical biological treatises, morphological and physiological, are read every session; each competent student taking his turn, week by week.

From this time on, the student's work becomes still more specialized: he is given a suggestion for some original research and left to carry it out with less or more supervision and direction according to his capacity. His third year is usually mainly given up to conducting a research for his graduation thesis, to revising his previous studies, and to additional reading suggested by his chief instructor.

The laboratory receives properly qualified graduate students

who desire to engage in advanced work or research, although they may not be candidates for the degree of doctor, or may have already attained it. To such students it affords rather unusual facilities for study in animal physiology and in comparative embryology.

Special students, not graduates or candidates for a degree, are received on conditions stated in the Register.

There is issued from the laboratory an illustrated journal, the "Studies from the Biological Laboratory," in which are published many of the researches completed by members of the biological department. A ready means of publication for any good work is thus secured. Three volumes each of about 500 pages, and containing from twenty to thirty plates, have been completed, and the fourth volume is now in progress.

PSYCHOLOGY AND PEDAGOGIGS; LOGIC AND ETHICS.

Higher instruction in the philosophical department is given by means of lectures, recitations, seminary, conference, laboratory work, and excursions.

The lectures of Professor Hall,* who is at the head of this group of studies, consist of three courses, each extending over three years.

In *Psychology*, the first year's work is devoted to the general properties of the nervous substance, psycho-physics of the special senses, their defects, and the theory of knowledge, and coincides largely with the field covered by Ladd's *Psychology*. Thorough preparation in this part of the course is of fundamental importance for the modern psychologist, and unless it is well done his future work is on an insecure basis.

* Resigned after the preparation of these pages.

The work of the second year includes perception of time and space, the time-sense, psycho-physic law, mental images (morbid and normal) and their associations, and the leading topics in morbid psychology.

The topics of the third year include reflex action, instinct, psycho-genesis, the psychology of problems of language, myth, custom and belief, anthropologically considered, hypnotism, and the psychological side of systems of philosophy and ethnic religions. This work is supplemented by directions for special reading on each topic, illustrative apparatus, and by psychological clinics at the neighboring asylum on aphasia, illusions and hallucinations, epilepsy, mania, hysteria, etc.

Dr. Donaldson gives two courses—one on the histology of the senses, the other on that of the central nervous system. These courses and those of Dr. Hall coincide and supplement each other.

Both courses include laboratory work for practice, in addition to the opportunities for special original research offered in the experimental and histological fields.

In connection with these courses an evening seminary is held weekly through the year.

A quarterly journal—*The American Journal of Psychology*—is published under the editorial care of Professor Hall.

History of Philosophy.—The lectures in historical and ethical psychology also extend over three years. The first year is devoted to the Greek philosophy; the second ends with Hegel; and the third is devoted to contemporary writers. The work is not confined to the field commonly called the history of philosophy, but attention is given to material from the history of science, of medicine, and of education. Mainly, however, the course, except in the last part of the third year, coincides with the standard text-books

in the history of philosophy. The material is treated objectively and from a psychological standpoint. A weekly seminary is held in connection with this course.

Education.—The educational lectures of the first year are historical. Those of the second year are devoted to the problems of primary and intermediate, and those of the third to special chapters in the field of higher education. Among the topics of the present third year are, *e. g.*, general vs. special education; chairs of pedagogy in this country and Europe; educational endowments; school legislation; the relation between science and the state; the organization and operation of learned societies and scientific and other academies; the constitution and methods and history of European universities from the Renaissance; the educational value of philosophical systems; professional schools of law, medicine, theology, technological and industrial schools; the French, English, German, and American school and college systems in their method and idea; the development and nature of student life; history and theory of examinations and degrees; and academic festivals and traditions. A guide-book to the literature of the chief topics of this course was published in 1886, entitled *Bibliography of Education*.

This course is supplemented by a series of excursions to institutions of pedagogical interest conducted by Professor Hall.

This course does not lead to a degree. Those who desire to study education professionally are advised to give their energy to psychology which is its chief scientific basis, pedagogy being a field of applied psychology.

Some of the special topics in which the above work naturally falls are attended as special courses by students of other departments, thus, *e. g.*, students of Greek may attend the lectures in Greek philosophy; of morphology, the lectures on

instinct; of astronomy, the lectures on reaction-time and the personal equation; of history, the lectures in the history of philosophy, and especially the courses on Roman and English law by Mr. Emmott, which are also closely related to the work in ethics. Students of biology or pathology may follow the histological courses of Dr. Donaldson, and the lectures on morbid psychology by Professor Hall. There are also courses in other departments which supplement the work in this. Those especially recommended are the following: Professor Gildersleeve's seminary work in Plato for students of the history of philosophy; Professor Martin's course in animal physiology, especially that part on the senses and nerve centres, for students of psycho-physics; Professor Story's algebraical logic; Dr. Ely's classes in political economy.

Courses of lectures by students are from time to time arranged, and a reading club is conducted, where individual reading is reported for mutual benefit.

In the undergraduate course in Psychology, etc., by Professor Hall, the work is essentially practical. Lessons of mental and moral hygiene are mainly inculcated.

Logic and Ethics.—The undergraduate courses in Logic, Ethics, and Psychology provide five hours per week of required work for one year. The courses in Logic and Ethics are given by Associate Professor Emmott. In Logic, particular attention is given to the general theories of both deduction and induction, to the various forms of thought, notion, judgment, and reasoning, and to the various methods of scientific investigation and proof, as well as to the application of the rules of the syllogism, and the detection of the various kinds of fallacies.

The text-books used are Jevons's *Elementary Lessons in Logic*, and Fowler's *Elements of Inductive Logic*, and references are

given to the larger works of Jevons and to the works of Mill, Bain, Venn, and other recent writers. The work consists of frequent recitations and of short informal lectures, and numerous written exercises are given out from time to time in the opposition and conversion of propositions, in indication and counter-indication, in the application of the rules of the syllogism, in the detection of fallacies, and in the elimination of contradictions from thought.

In the class on Ethics the fundamental problems of moral philosophy, and their application to the guidance of conduct and to the formation of a manly character, are considered with special reference to the Christian theory of morals.

The text-book used is Janet's *Elements of Morals*, and references are given to numerous works, including Martineau's *Types of Ethical Theory*, Martensen's *Christian Ethics*, Maurice's *Social Morality*, and Janet's *Theory of Morals*. The work consists of frequent recitations, of informal lectures, and of numerous discussions, and two essays on assigned topics are required from each member of the class. The aim throughout is to make the instruction of a directly practical nature, and to show the bearing of the problems discussed upon the field of practical ethics. The topics treated of include the following: Analysis of the fundamental notions—good and bad, right and wrong, duty and obligation, conscience, liberty and moral responsibility, virtue and vice, merit and demerit, etc. The object of morality: theoretical and practical morality. Division of duties according to the various relations of man. The general principles of social morality. Division of the duties of justice. Duties of charity and self-sacrifice. Duties towards the state. Duties of professional life. The general principles of the moral law applied to nations in their dealings with each other. The duties of the married state. The duty of self-preservation. The necessity and proper use of external goods. Duties relative to the proper exercise of the intellectual virtues. Duties relative to the will. Courage. The general principles of religious morality. Religious rights and duties. Connection between morality and religion.

PATHOLOGY.

The Pathological Institute was opened in October, 1886, under the direction of Professor Welch. By permission of the Trustees of the Johns Hopkins Hospital the use of the pathological building of the Hospital was granted to the University. The structure is of two stories, well lighted and arranged, and includes ten rooms, in addition to the autopsy theatre.

Certain rooms are devoted to work in pathological histology and to pathological demonstrations, others to bacteriological work, and others to experimental pathology. Rooms are also equipped for microscopical photography. The museum already contains a valuable collection of morbid specimens. The instruction in Pathology is under the direction of Dr. W. H. Welch, Professor of Pathology, assisted by Dr. W. T. Councilman, Associate Professor of Anatomy, Dr. B. Meade Bolton, Assistant in Bacteriology, and Dr. F. P. Mall, Fellow in Pathology. Facilities are afforded for study in all departments of pathology, including bacteriology.

The course in Pathological Histology presupposes on the part of the student a knowledge of normal histology. This course, which continues throughout the greater part of the year, embraces the study of subjects in general pathology and of the special pathological histology of all the organs and tissues of the body. For these purposes an ample material has been collected. Each student is expected to become familiar both with the technique of pathological histology and with the interpretation of the various morbid changes in the different organs and tissues. He is encouraged to supplement the regular class work by independent and farther study of subjects in pathological histology, and thus prepare himself to form correct judgments of the

various pathological changes. Demonstrations of fresh pathological specimens are made at least once a week in connection with the course in pathological histology. Sufficient material for these demonstrations is obtained from the Bay View Asylum and other sources in the city. Especial importance is attached to the microscopical study of the fresh specimens chiefly by the aid of frozen sections, as the student is thus enabled to compare the gross and the microscopical appearances, and to observe such microscopical alterations as are more evident in fresh than in hardened specimens.

Opportunity is afforded to become familiar with the method of making post-mortem examinations. A number of these examinations are performed weekly by Dr. Councilman.

On account of the increasing importance of the subject, special attention is given to the collection and study of material in Comparative Pathology.

The Pathological Institute is equipped with apparatus for studies in Experimental Pathology. In this, as well as in other departments of pathology and in bacteriology, the resources of the institute are open to those who are prepared to engage in special investigations.

Instruction in Bacteriology is given by Professor Welch, with the co-operation of Dr. Bolton. The bacteriological laboratory is supplied with all the apparatus required by the modern methods of investigation in this important department. There is a large collection of cultures of the most important and interesting micro-organisms belonging to this branch of study. In the bacteriological course, students are instructed in the modern methods of cultivating bacteria, and are taught to study the morphological and biological characters of the bacteria and fungi, particularly of those

relating to disease. The methods of making biological examinations of air, water, etc., are taught.

It is earnestly recommended to those who expect to make a special study of pathology or bacteriology, to acquire a reading knowledge of French and German. Preliminary training in physics, chemistry, and biology forms the best preparation for the successful pursuit of pathology as well as of medicine in general.

DRAWING.

The instruction in drawing is so arranged as to give a student a general knowledge of the art, so far as the time at his command will permit, while those who have special aptitude are encouraged to follow more advanced courses. Undergraduates take up drawing as one of their required studies, unless they can show to the authorities that they have already attained a fair proficiency in this art. Graduate students are allowed the privilege of receiving lessons. Those who look forward to scientific pursuits, especially those who study natural history on the one hand, and physics and other branches of applied mathematics on the other hand, find these courses of great value.

Instruction is given in free-hand, and in mechanical or instrumental drawing.

In free-hand drawing the student is at once put to draw from models. Beginning with the most simple forms, he proceeds through a series of studies till he is able to produce a fair drawing of any simple object or objects, in outlines and in light and shade. No copying is engaged in. The chief instrument used is the lead pencil, and afterwards pen and ink, charcoal or crayon. No careless work is permitted, and the work is to be executed with precision and truthfulness. Thus, from the beginning, by personal attention to

each student, care and exactness are inculcated in rendering the appearance of objects, the aim being to teach the student to draw what is placed before him. After this general course has been completed, instructions are given in drawing from natural forms of all kinds, and in sketching from nature, in pencil, pen and ink, and water colors.

By this system, in one or two years, with a fair amount of diligence, the student is able to draw and color any subject which may be presented to him, and to illustrate on the blackboard, if engaged in teaching.

While the work of free-hand drawing is being carried on, instrumental or mechanical drawing is also attended to. Instruction is given weekly to classes, by lectures, illustrated by drawings on the blackboard. In this way the elements of perspective, isometrical, and topographical drawing are taught, and also plans, elevations, sections, and developments, and mechanical drawings from models, intersections of solids, and projection of shadows.

The students are required to work from written data, after the principles involved in each lesson have been explained at the blackboard, and to make a finished drawing in ink.

Occasional examinations are given to test the proficiency attained by the students in their studies.

PHYSICAL TRAINING.

The Gymnasium consists of a main hall, the director's office, and a series of dressing rooms which are furnished with lockers, and the usual appliances for bathing. Adjacent to it are studies and conversation rooms for the use of students; a room in which luncheon is served daily; and a yard which is available during most of the year for the purpose of tennis-play, and baseball and lacrosse practice. The gymnasium, which is intended for the use of all the students

in the university, is placed under the charge of a director, Dr. Hartwell, who is a graduate of the biological department of this university and also a graduate in medicine. The main hall is furnished with a representative set of the Sargent developing machines, as well as with ordinary gymnastic appliances of the most approved pattern. All students are encouraged to consult the director touching questions of regimen and exercise. The Clifton playground, used by the students for athletic sports, is also under his supervision. All undergraduates are required to report to him, from time to time, for physical examination and for advice. Class instruction in Swedish free movements and in heavy gymnastics is given thrice weekly, during most of the year, by Mr. Nissen, Instructor in Gymnastics, who is practically familiar with the Swedish and German systems of practice and instruction. Undergraduates are required at the beginning of their course to attend lectures on selected health topics, which are given weekly by Dr. Hartwell during the first half of the academic year.

By combining the use of the Sargent machines, under scientific direction, for the purposes of promoting healthful and symmetrical development, with class instruction in Swedish and German gymnastics, whose ends are more distinctly educational, efforts are making to establish a systematic, graded, progressive course of physical training to meet the wants of graduates and undergraduates alike. The best European experience shows that systematic physical training is of the utmost use, not only in promoting the health of students but also in developing brain power and intelligent self-control.

LIBRARIES.

1. The UNIVERSITY LIBRARY numbers over 35,000 bound volumes selected with special reference to the instruction here given. It is arranged in several departments, of which these are the chief :

General reference.	Biological.
Historical (including the Bluntschli collection).	Classical.
Mathematical and Physical.	Shemitic and Sanskrit.
Chemical.	Romance Languages.
	Teutonic Languages.

The general reference and reading room is open daily from 9 a. m. to 10 p. m. ; the other rooms in accordance with special regulations.

The Library receives the publications of all the leading scientific societies of the world and the chief literary and scientific periodicals. The whole number of serials received exceeds one thousand. This list is supplemented by those of the Peabody Institute and other institutions of the city, so that the whole number of journals accessible to students (exclusive of ephemeral publications) exceeds twelve hundred. Important books, English, German, and French, are received by the Library as soon as published, by purchase or by the courtesy of dealers.

2. The LIBRARY OF THE PEABODY INSTITUTE is a choice collection of books purchased since 1866. It is particularly full in academic transactions, long historical series, and costly illustrated books. It numbers 90,000 volumes, well bound, catalogued, and arranged. It is open daily without charge from 9 a. m. to 9 p. m.

3. The Maryland Historical Society Library contains 23,000 volumes of historical works, and is open daily.

Other libraries of Baltimore are the New Mercantile Library (40,000 volumes), the Bar Library (11,000 volumes), the Medical and Chirurgical Library (6,000 volumes), the Pratt Free Public Library (60,000 volumes), the Maryland Episcopal Library (10,000 volumes), and the Library of the Maryland Institute (20,000 volumes).

Washington is so near that its museums and libraries may be easily visited. Among the chief institutions of interest to students are these :

The Smithsonian Institution and National Museum.
The Library of Congress.
The Army Medical and Surgical Museum and Library.
The U. S. Coast and Geodetic Survey.
The U. S. Geological Survey.
The U. S. Naval Observatory.
The U. S. Signal Service.
The U. S. Agricultural Bureau.
The U. S. Census Office.
The U. S. Bureau of Education.
The Libraries of the Departments.
The Corcoran Art Gallery.

GRADUATE STUDENTS, 1887-88.

FELLOWS BY COURTESY.

- William M. Arnolt, B. D., New Brunswick (N. J.) Theological Seminary; former Fellow, Johns Hopkins University.
- Philip S. Baker, A. B. and A. M., Indiana Asbury University; M. D., Indiana Medical College; Professor of Chemistry in De Pauw University.
- Louis Bell, A. B., Dartmouth College; former Fellow, Johns Hopkins University.
- Richard G. Boone, Professor of Pedagogics, Indiana University.
- William H. Burnham, A. B., Harvard University; former Fellow, Johns Hopkins University.
- Benjamin C. Burt, A. B. and A. M., University of Michigan; Assistant Professor of English, etc., in the University of Michigan; former Fellow, Johns Hopkins University.
- John P. Campbell, A. B., Johns Hopkins University; former Fellow, Johns Hopkins University.
- Henry Clarke, A. B. and A. M., University of London; former Fellow, Johns Hopkins University.
- Herbert C. Elmer, A. B., Cornell University; Ph. D. and former Fellow, Johns Hopkins University.
- John C. Fields, A. B., University of Toronto; Ph. D. and former Fellow, Johns Hopkins University.
- Robert O. Graham, A. B. and A. M., Amherst College; late Professor in Westminster College, Pa.
- Rufus L. Green, S. B., Indiana University; Associate Professor of Mathematics, Indiana University.
- Milton Haight, A. B., University of Toronto; former Fellow, Johns Hopkins University.
- John L. Hall, Randolph Macon College; former Fellow, Johns Hopkins University.
- James H. Hyslop, A. B. and A. M., University of Wooster; Ph. D. and former Fellow, Johns Hopkins University.
- Joseph Jastrow, A. B. and A. M., University of Pennsylvania; Ph. D. and former Fellow, Johns Hopkins University.

- George T. Kemp, A. B., and Ph. D., and former Fellow, Johns Hopkins University.
- William A. Lamberton, A. B. and A. M., University of Pennsylvania; late Professor of Greek in Lehigh University.
- Yuzero Motora, Japan; former Fellow, Johns Hopkins University.
- Julius Nelson, S. B. and M. S., University of Wisconsin; former Fellow, Johns Hopkins University.
- Orray T. Sherman, A. B., Yale College; late Assistant in the Astronomical Observatory of Yale University.
- Edward P. Smith, A. B. and A. M., Amherst College; Professor in the Worcester Polytechnic Institute.
- George M. Sternberg, M. D., College of Physicians and Surgeons (N. Y.); Surgeon, U. S. Army.
- William C. Thayer, A. B., Columbia College, and A. M., Williams College; late Professor in Hobart College.
- Henry D. Todd, U. S. Naval Academy; Professor on duty at the Nautical Almanac Office.
- John R. Wightman, A. B. and A. M., University of Toronto; former Fellow, Johns Hopkins University.
- Charles E. Wright, University of Berlin; State Geologist of Michigan.

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FELLOWS.

- Edgar P. Allen, A. B., Emory College.
- Joseph S. Ames, A. B., Johns Hopkins University.
- Philip W. Ayres, Ph. B., Cornell University.
- William S. Eichelberger, A. B., Johns Hopkins University.
- Henry R. Fairclough, A. B. and A. M., University of Toronto; now Lecturer in Greek in the University of Toronto. (Resigned.)
- William C. L. Gorton, A. B., Johns Hopkins University.
- William H. Hobbs, S. B., Worcester Polytechnic Institute.
- Joseph H. Kastle, S. B. and M. S., Kentucky State College.
- Felix Lengfeld, California College of Pharmacy.
- Archibald MacMechan, A. B., University of Toronto.
- Herbert W. Magoun, A. B. and A. M., Iowa College.
- Franklin P. Mall, M. D., University of Michigan.
- Thomas McCabe, A. B., Johns Hopkins University.
- John L. Moore, A. B. and A. M., Princeton College.
- Augustus T. Murray, A. B., Haverford College.

George T. W. Patrick, A. B., Iowa University, and B. D., Yale University; now Professor of Philosophy and Didactics, Iowa State University. (Resigned.)

Edmund C. Sanford, A. B., University of California.

Charles L. Smith, S. B., Wake Forest College.

Arthur C. Wightman, A. B., Wofford College.

Henry V. P. Wilson, A. B., Johns Hopkins University.

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UNIVERSITY SCHOLARS.

Charles McL. Andrews, A. B., Trinity College (Conn.).

Edward C. Applegarth, A. B., Johns Hopkins University.

Richard H. Bayard, A. B., Johns Hopkins University.

William M. Burton, A. B., Adelbert College.

Morgan Callaway, Jr., A. B., and A. M., Emory College.

Charles E. Coates, Jr., A. B., Johns Hopkins University.

Paul J. Dashiell, A. B., Johns Hopkins University.

Alfred R. L. Dohme, A. B., Johns Hopkins University.

George P. Dreyer, A. B., Johns Hopkins University.

Edwin W. Fay, A. M., Southwestern Presbyterian University.

Julius Friedenwald, A. B., Johns Hopkins University.

Adam C. Gill, A. B., Amherst College.

Jay C. Guggenheimer, A. B., Johns Hopkins University.

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Thomas Logie, A. B., University of Toronto.

Robert M. McLane, Jr., A. B., Johns Hopkins University.

Daniel A. Murray, A. B., Dalhousie College.

John M. Pierce, A. B., Washington University.

John Charles Robertson, A. B., University of Toronto.

Shozaburo Watase, S. B., Sapporo Agricultural College (Japan).

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OTHER GRADUATE STUDENTS.

John C. Adair, A. B., Westminster College (Pa.).

Alfred Allen, A. B. and A. M., Alfred University.

Eugene T. Allen, A. B., Amherst College.

Henry C. Armstrong, Jr., S. B., Ala. Agr. and Mech. College.

William W. Baden, A. B., Johns Hopkins University, and LL. B., University of Maryland.

Maurice Barnett, S. B., College of City of New York.

H. F. H. Baughmann, A. B. and A. M., Western Maryland College.

Charles H. Bedell, S. B., Haverford College.
Arthur E. Bibbins, Ph. B., Albion College.
William Bignell, A. B., Allegheny College.
Samuel A. Binion, M. D., University of Maryland.
Frank W. Blackmar, Ph. B. and A. M., University of the Pacific.
Charles C. Blackshear, A. B., Mercer University.
Benjamin L. Bowen, A. B., Rochester University.
Jeffrey R. Brackett, A. B., Harvard University.
Charles F. Brédé, A. B., Haverford College.
Charles E. Brewer, A. M., Wake Forest College.
Alfred H. Bucherer, University of Bonn.
James Buckham, A. B. and A. M., University of Vermont.
Richard E. Burton, A. B., Trinity College.
Louis G. Carpenter, B. S. and M. S., Michigan Agric. College.
Eugene Chaney, A. B., Dickinson College.
Charles H. Chapman, A. B., Johns Hopkins University.
Thomas E. Cheek, L. B., Wake Forest College (N. C.).
Thomas D. Coleman, A. B., Kentucky University.
Elisha Conover, Jr., A. B. and A. M., Dickinson College.
Frank P. Cox, S. B., Rose Polytechnic Institute.
James Cummings, A. B. and A. M., University of Tennessee.
John Daniel, A. B. and A. M., University of Alabama.
R. J. J. de Roode, Jr., S. B. and M. S., Kentucky State College.
Hermann L. Ebeling, A. B., Johns Hopkins University.
George W. Edmond, A. B., Johns Hopkins University.
Charles L. Edwards, S. B., Indiana University.
Harry Falkenau, B. L., Cornell University.
Henry T. L. Fernald, S. B., Maine State College.
John H. Finley, A. B., Knox College (Ill.).
Robert J. Finley, S. B., Knox College (Ill.).
Robert E. Gaines, A. M., Furman University (S. C.).
Henry B. Gardner, A. B., Brown University.
Charles J. Goodwin, A. B., Bowdoin College.
Charles S. Hartwell, A. B., Amherst College.
Joseph E. Harry, A. B., Johns Hopkins University.
Charles H. Haskins, A. B., Johns Hopkins University.
Eldridge B. Hatcher, A. M., Richmond College.
James T. Hatfield, A. B. and A. M., Northwestern University.
Erasmus Haworth, S. B. and M. S., Kansas University.
George A. Hench, A. B., Lafayette College.
George L. Hendrickson, A. B., Johns Hopkins University.
Francis H. Herrick, A. B., Dartmouth College.

- Charles H. Herty, Ph. B., University of Georgia.
 Adolph A. Himowich, S. B. and M. D., New York University.
 Clifton F. Hodge, A. B., Ripon College.
 Charles C. Holden, University of Virginia.
 Frank G. Hubbard, A. B., Williams College, and Ph. D., Johns
 Hopkins University.
 James G. Hume, A. B., University of Toronto.
 Cary T. Hutchinson, Ph. B., Washington University.
 Toyo K. Iyenaga, Ph. B., Oberlin College.
 Joseph L. Jayne, U. S. Naval Academy.
 Louis Katzenstein, University of Berlin.
 James T. Lees, A. B., Adelbert College (O.).
 Hampden S. Lewis, A. B., Tulane University.
 David J. Lingle, S. B., University of Chicago.
 Alvin F. Linn, A. B., Wittenberg College (Ohio).
 Augustus W. Long, A. B., University of North Carolina.
 Hiram B. Loomis, A. B., Trinity College (Conn.).
 James Mahoney, A. B., Amherst College.
 Henry F. Marx, A. B., Lafayette College.
 John E. Matzke, A. B., Hope College (Mich.).
 John H. T. McPherson, A. B., Johns Hopkins University.
 Colyer Meriwether, A. B., Johns Hopkins University.
 Wilmot V. Metcalf, A. B., Oberlin College.
 George F. Metzler, A. B. and A. M., Albert College (Ont.).
 John I. Middleton, Jr., A. B., Princeton College.
 Kelly Miller, A. B., Howard University (D. C.).
 Frank E. Millis, A. B., De Pauw University.
 William M. Milroy, A. B., Geneva College; B. D., Yale University;
 A. M., Westminster College.
 Thomas H. Morgan, S. B., Kentucky State College.
 Charles W. Moulton, A. B., University of Minnesota.
 Barker Newhall, A. B., Haverford College.
 Chalmers C. Norwood, A. B., Davidson College.
 Claire A. Orr, A. B., University of Michigan.
 Robert M. Parks, Jr., A. B., Indiana University.
 Mansfield T. Peed, A. M., Randolph Macon College.
 Samuel L. Powell, A. B., Pennsylvania College.
 Wyatt W. Randall, A. B., St. John's College.
 Thomas G. Rector, M. S., West Virginia University.
 William D. Reynolds, Jr., A. B. and B. L., Hampden-Sidney Col-
 lege.
 Jacob M. Rich, E. M. and C. E., Columbia College.
 George M. Richardson, A. C., Lehigh University.

John T. Roberts, A. B., Davidson College.
 John Cunningham Robertson, A. M., University of Virginia.
 Henry S. Scribner, A. B. and A. M., Princeton College.
 Joseph S. Sheffoe, A. B., Norwegian Luther College.
 James H. Smith, A. B., Oberlin College.
 Kirby W. Smith, A. B., University of Vermont.
 Aristogeiton M. Soho, Syra (Greece) Gymnasium.
 Miles W. Sterling, A. B., University of Kansas.
 Edward L. Stevenson, A. B. and A. M., Franklin College (Ind.).
 Walter P. Stradley, A. M., Wake Forest College.
 Jacob A. Strite, A. B., Dickinson College.
 Henry Taber, Ph. B., Yale University.
 Samuel F. Tower, A. B., Dartmouth College.
 William P. Trent, A. M., University of Virginia.
 James S. Trueman, A. B., Dalhousie College.
 George M. Turner, S. B., Amherst College.
 Lemon L. Uhl, A. B. and A. M., Wittenberg College (Ohio).
 Edward P. Van Kirk, B. M., Lehigh University.
 John M. Vincent, A. B., Oberlin College.
 Julian L. White, Ph. B., Columbia College.
 Richard J. White, A. B., Haverford College.
 John E. Wiatt, A. B. and A. M., Richmond College.
 Henry H. Wiegand, A. B., Johns Hopkins University.
 Gilbert Wilkes, U. S. Naval Academy.
 Julius T. Willard, S. B. and M. S., Kansas State Agric. College.
 Lucius E. Williams, A. B., Mercer University.
 William K. Williams, A. B., Johns Hopkins University.
 Augustus Wood, A. B., Brown University.
 Thomas K. Worthington, A. B., Haverford College.

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ATTENDANTS ON SINGLE COURSES.

Chesapeake Zoölogical Laboratory.

PROFESSOR W. K. BROOKS, PH. D., DIRECTOR.
 (Tenth Session, at Nassau, March-August, 1887.)

Julius Nelson, S. B., University of Wisconsin, late Fellow.
 H. V. Wilson, A. B., Johns Hopkins University, Fellow.
 H. T. L. Fernald, S. B., Maine State College.
 F. H. Herrick, A. B., Dartmouth College.
 A. H. Jennings.
 Professor J. P. McMurrich, A. B. and A. M., University of Toronto; Ph. D., Johns Hopkins University; Professor in Haverford College.

Dr. C. S. Dolley, M. D., University of Pennsylvania; Professor in Swarthmore College; with four students, namely: M. J. Greenman, A. L. Lamb (J. H. U.), E. P. Marshall, Jr., and C. F. Nassau.

Pathology.

Frank C. Ard, M. D., University of Maryland.
 William D. Booker, M. D., University of Virginia.
 Henry T. Brooks, M. D., Albany Medical College.
 John W. Chambers, M. D., College of Physicians and Surgeons (Baltimore).
 Daniel M. Easter, M. D., University of Pennsylvania.
 Frank D. Gavin, M. D., University of Maryland.
 William S. Halsted, A. B., Yale University; M. D., College of Physicians and Surgeons (N. Y.).
 John U. Hobach, A. B., Franklin and Marshall College; M. D., University of Pennsylvania.
 Caspar O. Miller, M. D., University of Virginia.
 Robert L. Randolph, M. D., University of Maryland.
 Fremont L. Russell, B. S., Maine State College; V. S., New York College of Veterinary Surgeons.
 Frederick S. Thomas, M. D., University of Maryland and Bellevue Hospital Medical College.

Physiology.

James G. Wiltshire, M. D., University of Maryland.

Histology.

Nathaniel T. Carswell, M. D., College of Physicians and Surgeons (Baltimore).
 Archer C. Harrison, M. D., University of Maryland.

Psycho-Physics.

John C. Hemmeter, M. D., University of Maryland.
 George J. Preston, A. B., Washington and Lee University; M. D., University of Pennsylvania.

Hebrew and other Shemitic Languages.

Rev. Howard F. Downs.
 Rev. Ashby J. Fristoe, Richmond College.
 Rev. Charles F. W. Lamm.
 Rev. Whitford L. McDowell.
 Rev. Charles A. Schloegel.
 Rev. Edward L. Watson.

History of Philosophy.

- Rev. Chauncey B. Brewster, A. M., Yale University.
Rev. Augustus Davisson, Vanderbilt University.
Rev. John N. McCormick, A. B., Randolph Macon College.
Rev. Daniel T. Phillips, Haverfordwest College (Wales).
Rev. Ed. M. Poteat, A. B., Wake Forest College.
Rev. William F. Slocum, A. B., Amherst College.
Rev. Hobart H. Smith.
Richard H. Woodward, Virginia Military Institute.

Pedagogics.

- Toshihide Shinoda, Tokio Normal School.

History.

- James D. Murray, Jr., A. B., St. Johns College; LL. B., University of Maryland.
Theophilus J. Schaumloeffel, University of Maryland (Law School).
Rev. Leyburn M. Bennett, A. B., Western Maryland College.

Political Science.

- Charles M. Howard, A. B., Johns Hopkins University.
William H. Perkins, Jr., A. B., Johns Hopkins University.
Henry O. Thompson, A. B., Johns Hopkins University.

Political Economy.

- Clinton L. Riggs, C. E., Princeton College.

Historical Seminary.

- Percy M. Hughes, A. B., Johns Hopkins University.

Historical Jurisprudence (English Law).

- Edward A. Donnelly, University of Maryland (Law School).

Astronomy.

- Eudorus C. Kenney, S. B., Cornell University.

TABULAR STATEMENTS.

1. ACADEMIC STAFF, 1887-88.

President and Professors,	10
Associate Professors,	13
Associates,	12
Instructors and Assistants,	15
Lecturers and Readers,	7
	57

2. ENROLLED STUDENTS, 1887-88.

Graduates (including Fellows),	234
Matriculantes (including Candidates),	127
Special (including Preliminary Medical),	62
	423

The above enumeration includes

Doctors of Philosophy, 6	Bachelors of Laws, 2
Doctors of Medicine, 20	Bachelors of Arts, 132
Clergymen, 17	Bachelors of Science, 22
Masters of Arts, 37	Bachelors of Philosophy, 8
Masters of Science, 7	Holders of other Degrees, 9
Bachelors of Divinity, 3	

3. ATTENDANCE UPON THE VARIOUS COURSES OF INSTRUCTION, 1887-88.

Mathematics and Astronomy, 84	Shemitic Languages, 18
Physics, 85	Sanskrit and Comp. Philol. 40
Chemistry, 119	German, 130
Mineralogy, Geology, etc., 25	English and Anglo-Saxon, 84
Biology, 61	Romance Languages, 72
Pathology, 16	History and Polit. Science, 139
Greek, 61	Psychology and Pedagogics, 81
Latin, 74	Logic and Ethics, 36

4. CLASSIFICATION BY RESIDENCES OF STUDENTS, 1887-88.

Maryland (Balto., 153),	201	Delaware,	3
Pennsylvania,	17	Kansas,	3
New York,	16	Tennessee,	3
Virginia,	15	West Virginia,	3
District of Columbia,	13	Arkansas,	2
Illinois,	12	Louisiana,	2
Ohio,	12	New Hampshire,	2
Massachusetts,	11	Vermont,	2
Indiana,	9	Colorado,	1
New Jersey,	7	Florida,	1
North Carolina,	7	Nebraska,	1
Georgia,	6	Mississippi,	1
Connecticut,	5	Rhode Island,	1
Maine,	5	Utah,	1
Minnesota,	5		
Wisconsin,	5	Canada,	12
Iowa,	4	Japan,	7
Kentucky,	4	China,	1
Michigan,	4	England,	1
Missouri,	4	Germany,	1
South Carolina,	4	Mexico,	1
Alabama,	3	Italy,	1
California,	3	Russia,	1

5. SUMMARY OF ATTENDANCE, 1876-88.

Years.	Teachers.	Total Enrolled Students.	Graduate Students, including Fellows.	Matriculates, including Candidates.	Special, including Prel. Med.	Degrees Conferred.	
						A. B.	Ph. D.
1876-77.....	29 ¹	89	54	12	23
1877-78.....	34	104	58	24	22	..	4
1878-79.....	25	123	63	25	35	3	6
1879-80.....	33	159	79	32	48	16	5
1880-81.....	39	176	102	37	37	12	9
1881-82.....	43	175	99	45	31	15	9
1882-83.....	41	204	125	49	30	10	6
1883-84.....	49	249	159	53	37	23	15
1884-85.....	52	290	174	69	47	9	13
1885-86.....	49	314	184	96	34	31	17
1886-87.....	51	378	223	108	42	24	20
1887-88.....	57	423	234	127	62

¹ In the first two years the number of non-resident lecturers was much larger than it has been since.

6. LIST OF INSTITUTIONS IN WHICH THE STUDENTS (1887-88) WERE GRADUATED.

Johns Hopkins University,	30	Col. of Phys. and Surg. (Balt.)	1
University of Toronto,	9	Col. of Phys. and Surg. (N. Y.)	1
Amherst College,	7	Franklin College (Ind.),	1
University of Maryland,	7	Furman University (S. C.),	1
Haverford College,	6	Geneva College (Ohio),	1
University of Pennsylvania,	5	Hampden-Sidney College,	1
University of Virginia,	5	Hope College,	1
Wake Forest College,	5	Howard University,	1
Cornell University,	4	Imperial University of Tokio,	1
Oberlin College,	4	Indiana Medical College,	1
Yale University,	4	Iowa College,	1
Princeton College,	4	Iowa State University,	1
Columbia College,	3	Kansas State Agric. College,	1
Dartmouth College,	3	Maine State College,	1
Davidson College,	3	Michigan Agric. College,	1
Dickinson College,	3	New Brunswick Theol. Sem.,	1
Indiana University,	3	Northwestern University,	1
Kentucky State College,	3	Norwegian Luther College,	1
Randolph Macon College,	3	Pennsylvania College,	1
Richmond College,	3	Ripon College,	1
St. John's College (Md.),	3	Rose Polytechnic Institute,	1
Trinity College (Conn.),	3	Sapporo Agricultural College,	1
University of Michigan,	3	Southwestern Presby. Univ.,	1
United States Naval Acad.,	3	Tulane University,	1
Adelbert College,	2	University of Alabama,	1
Brown University,	2	University of Berlin,	1
Dalhousie College,	2	University of California,	1
De Pauw University,	2	University of Chicago,	1
Emory College (Ga.),	2	University of City of N. Y.,	1
Harvard University,	2	University of Georgia,	1
Knox College,	2	University of Kansas,	1
Lafayette College,	2	University of Kentucky,	1
Lehigh University,	2	University of London,	1
Mercer University,	2	University of Minnesota,	1
University of Kansas,	2	University of North Carolina,	1
University of Vermont,	2	University of Tennessee,	1
Washington University (Mo.),	2	University of the Pacific,	1
Western Maryland College,	2	University of Rochester,	1
Wittenberg College (Ohio),	2	University of Wisconsin,	1
Alabama Agr. and Mech. Col.,	1	University of Wooster,	1
Albany Medical College,	1	Washington and Lee Univ.,	1
Albert College (Canada),	1	Westminster College (Pa.),	1
Albion College,	1	West Virginia University,	1
Alfred University (N. Y.),	1	Williams College,	1
Allegheny College,	1	Wofford College (S. C.),	1
Bowdoin College,	1	Worcester (Mass.) Polyt. Inst.	1
Col. of the City of New York,	1		

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